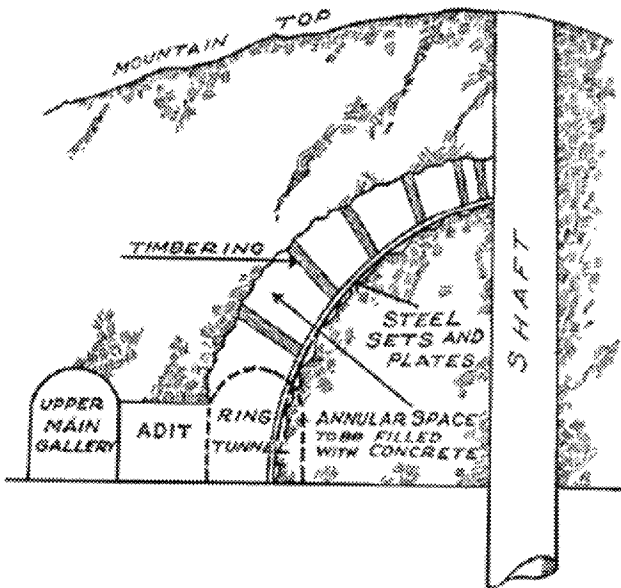


Evaluating Corrosion of the Steel Liners of the Red Hill Tanks



- How Corrosion Affects Integrity of the Red Hill Tanks Needs Further Study
- Although the Backside of the Steel Shell Cannot Be Visually Inspected, Non-Destructive Testing (NDT) Techniques Are Being Used to Identify Corrosion and Other Steel Shell Problems
- A Destructive Testing Program is Currently Being Planned to Validate the NDT Results

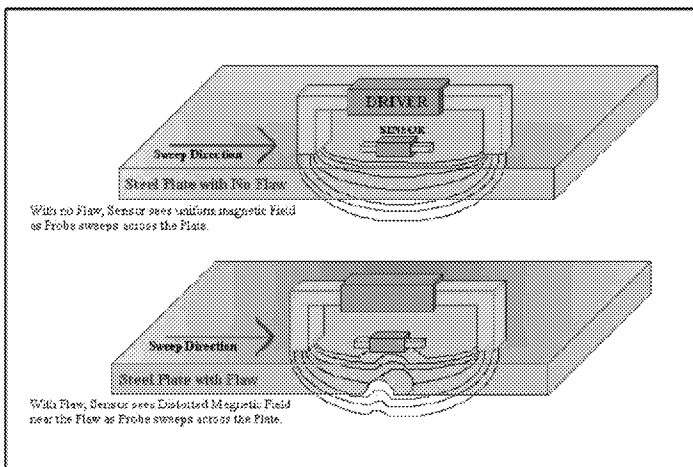
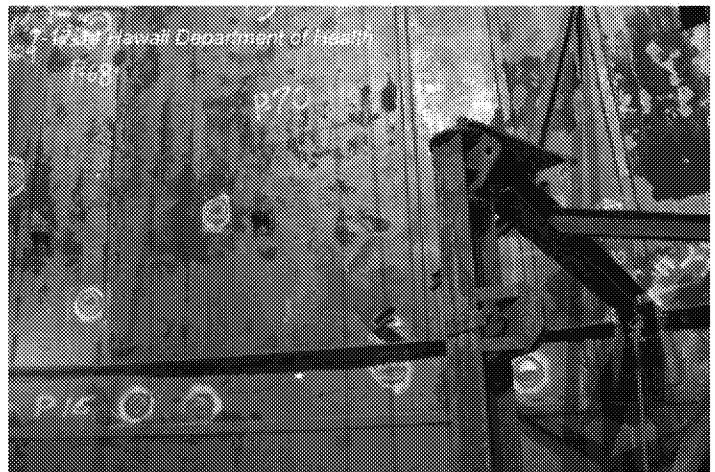


Figure 2-1. Principles of LFET

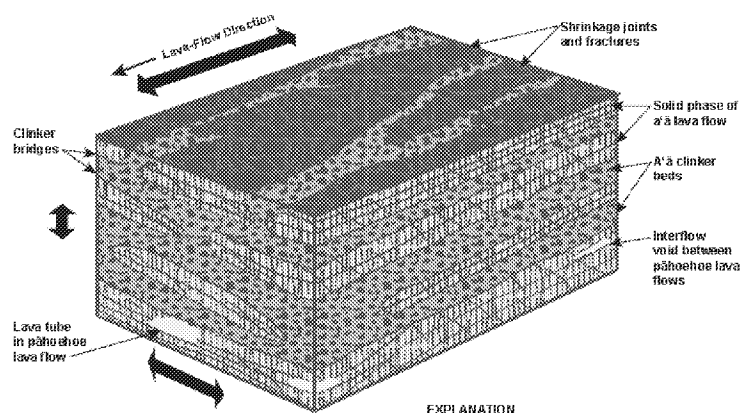


Work Being Done to Safely Store Fuel at Red Hill

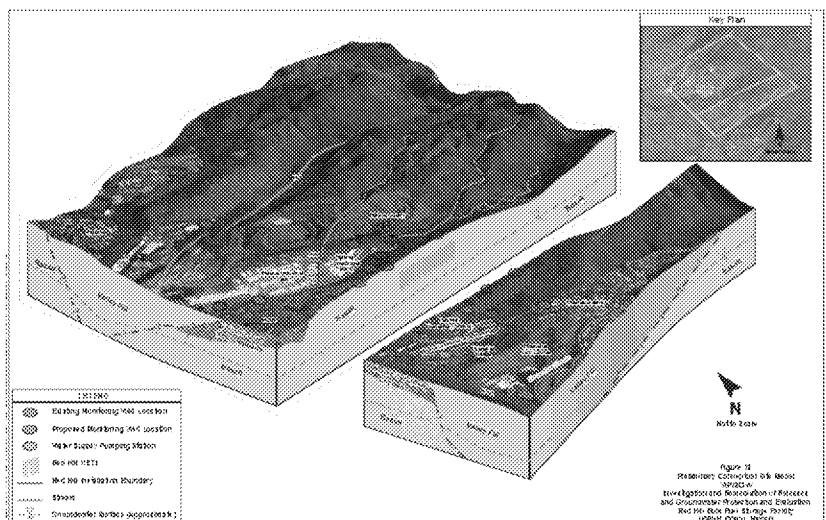
- Assure That the Combination of Technologies, Procedures, Practices, and Monitoring Are Adequate to Prevent Releases that Could Threaten Drinking Water Safety
- Assure the Probability and Magnitude of Potential Failures at the Facility is Well Understood, and Assess the Consequences of Potential Failures
- Assure the Navy is Using Best Available Practicable Technologies for the Infrastructure
- Assure that the Groundwater Monitoring Network and Monitoring Practices Are Protective of Drinking Water Quality

Reducing Uncertainty

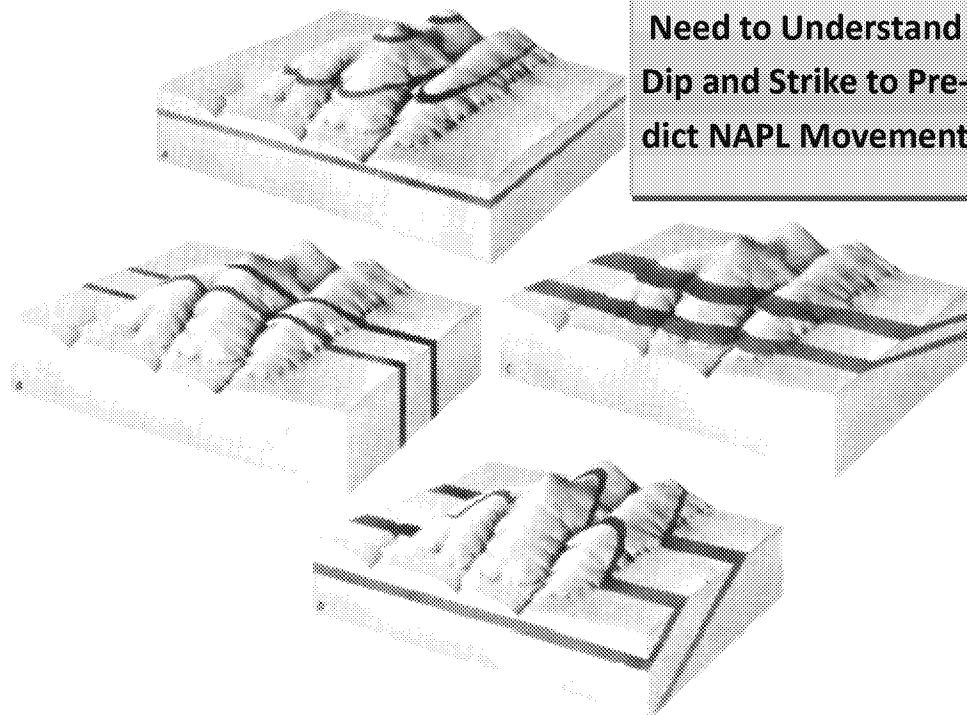
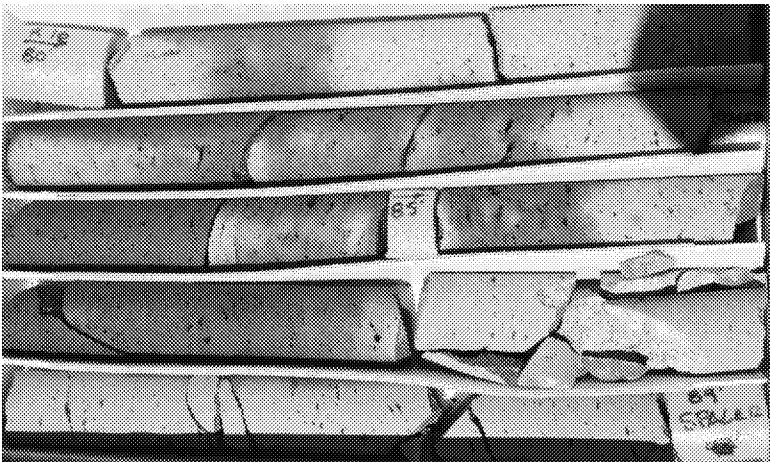
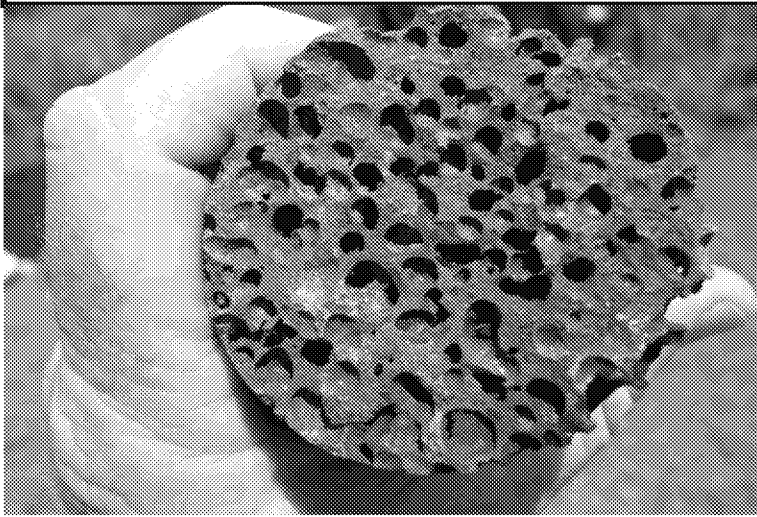
- Corrosion Rate of Steel Tank Lining
- Potential Failure Modes of Infrastructure
- Movement of Contamination in the Subsurface
- Movement on Fuel Above the Water Table
- Extent of Lateral Migration Above the Water Table
- Groundwater Flow Directions and Rates
- Rate of Natural Degradation



Note: Successive interbedded pahoehoe and aa flows often create highly irregular formations with various fractures and voids, interbedded with widespread areas of high horizontal permeability (L.C. Schematic only; modified from Takasaki and Valenciano 1985.)



Work to Better Understand Red Hill Geology



**Need to Understand
Dip and Strike to Pre-
dict NAPL Movement**

Why Did Tank 5 Leak Approximately 27,000 Gallons of Jet Fuel In January 2014?

- Patch Plates Were Installed to Address Defects Identified by Non-Destructive Testing (Standard Petroleum Industry Practice)
- The Quality of the Repairs Including the Welds Were Not Verified by the Navy
- The Contractor Doing the Work on Tank 5 was a New Contractor for Red Hill
- Tank 5 Was Rapidly Filled When Taken Back Into Service



Improvements Since Tank 5 Release

- New Repair Verification Procedures
- More Frequent Tank Tightness Testing
- New Procedures for Filling During Recommissioning After Repair
- New Alarm Response Procedures
- Improvements in Contractor Specifications

Agencies Hire Experts To Evaluate Red Hill



Tank Upgrade Alternatives

Options for Detailed Evaluation

1A—Single Walled—Restoration of Tank

- ♦ Current approach to inspection and repair with enhanced TIRM
- ♦ Coating of lower dome

1B—Single Walled—Restoration of Tank Plus Interior Coating

- ♦ Same as Alternative 1A plus coating of barrel and upper dome

1D—Single Walled—Remove Steel Liner and Install New Steel Liner

- ♦ Remove existing steel liner in its entirety
- ♦ Provide new carbon steel liner

2A—Double Walled—Composite Tank with Second Carbon Steel Liner

- ♦ Existing steel liner provides secondary containment
- ♦ Construct carbon steel liner with three inch interstitial space
- ♦ Internal coating of new steel liner

2B—Double Walled—Composite Tank with Stainless Steel Liner

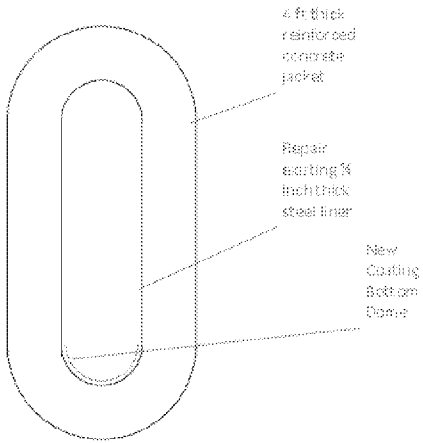
- ♦ Same as 2A except new internal liner is stainless steel
- ♦ No internal coating

3A—Double Walled—Tank within a Tank

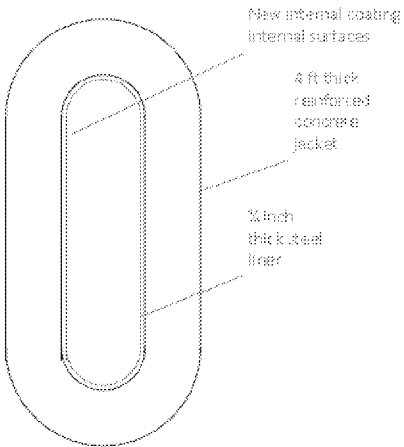
- ♦ Construct new carbon steel tank with five foot accessible annular space
- ♦ Existing steel liner provides secondary containment

Tank Upgrade Alternatives Options for Detailed Evaluation

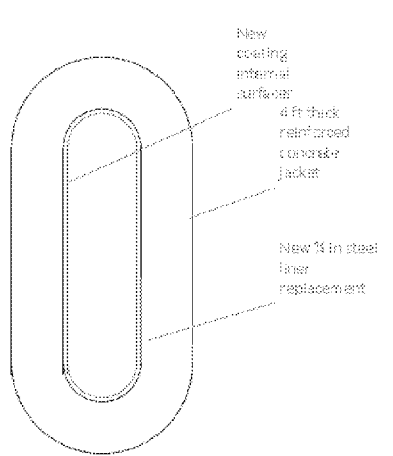
Alternate 1A



Alternate 1B



Alternate 1D



Alternate 2A/2B

